INFORMATION SHEET 2.2-5

IP Addressing

LEARNING OBJECTIVES

After reading this INFORMATION SHEET, STUDENT(S) MUST be able to:

- discuss the information about IP addressing and its components.
- know the difference between dynamic and static ip address.
- Know how to configure correct ip address.

THE IP (INTERNET PROTOCOL)

It is the fundamental protocol for communications on the Internet. It specifies the way information is packetized, addressed, transferred, routed, and received by networked devices.

IP history

- Its development began in 1974, led by computer scientists Bob Kahn and Vint Cerf. It is frequently used in conjunction with the Transmission Control Protocol, or TCP. Together they are ref
- erred to as TCP/IP.
- The first major version of the Internet Protocol was version 4, or IPv4. In 1981, it was formally defined in RFC 791 by the Internet Engineering Task Force, or IETF.
- The successor to IPv4 is IPv6, which was formalized by the IETF in 1998. It was designed to eventually replace IPv4. As of 2018, IPv6 governs approximately 20% of all Internet traffic.

An IP address is a number identifying of a computer or another device on the Internet. It is similar to a mailing address, which identifies where postal mail comes from and where it should be delivered. IP addresses uniquely identify the source and destination of data transmitted with the Internet Protocol.

IP address classes

With an IPv4 IP address, there are five classes of available IP ranges: Class A, Class B, Class C, Class D and Class E, while only A, B, and C are commonly used. Each class allows for a range of valid IP addresses, shown in the following table.

Class	Address range	Supports
Class A	1.0.0.1 to 126.255.255.254	Supports 16 million hosts on each of 127 networks.
Class B	128.1.0.1 to 191.255.255.254	Supports 65,000 hosts on each of 16,000 networks.
Class C	192.0.1.1 to 223.255.254.254	Supports 254 hosts on each of 2 million networks.
Class D	224.0.0.0 to 239.255.255.255	Reserved for multicast groups.
Class E	240.0.0.0 to 254.255.255.254	Reserved for future use, or research and development purposes.

Ranges 127.x.x.x are reserved for the loopback or localhost, for example, 127.0.0.1 is the loopback address. Range 255.255.255.255 broadcasts to all hosts on the local network.

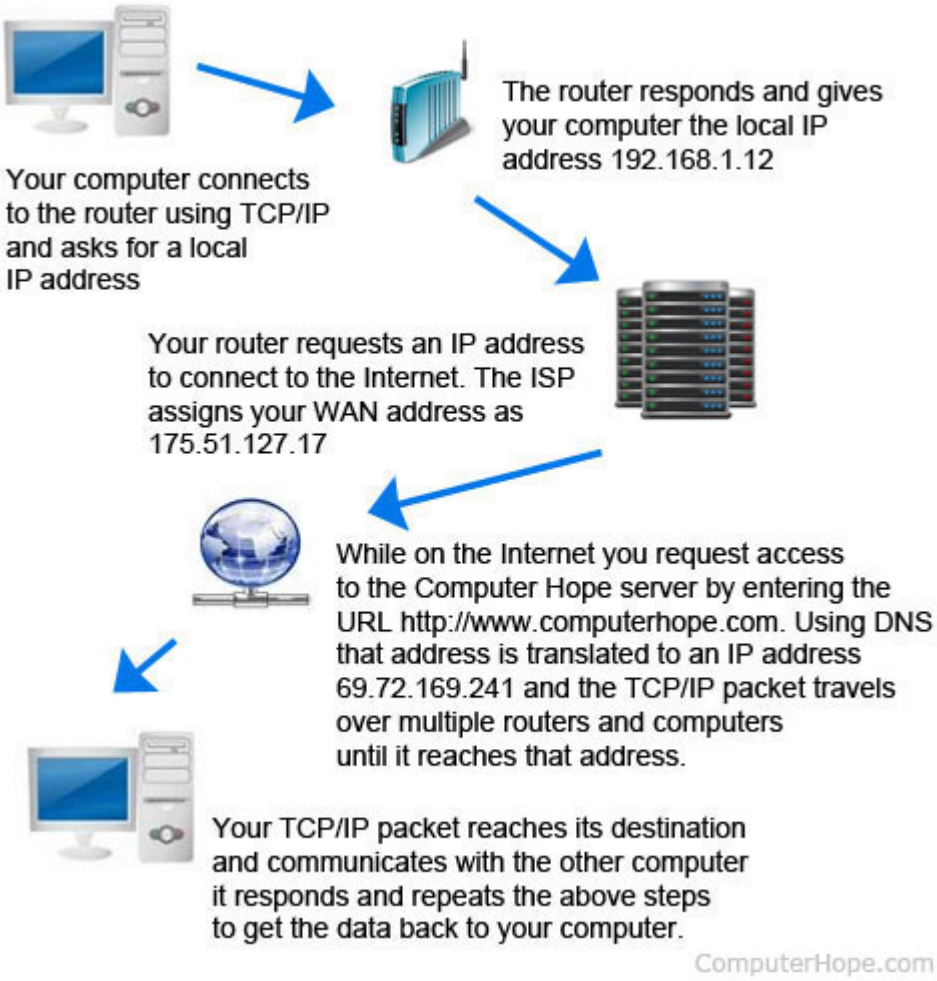
Static vs. dynamic IP addresses

IP addresses are assigned in two different ways. They may be dynamically assigned (they can change automatically) or statically assigned (they're intended not to change and must be changed manually). Most home networks use dynamic allocation. Your router uses DHCP to temporarily assign, or "lease," an IP address to your device. After a period of time, this lease "expires," and the router renews your old address or assigns you a new one, depending on the needs of the network and the configuration of the router.

If you have ever tried to change the settings on your router, you may be familiar with the address 192.168.1.1. Commonly, this is your router's address, If you enter this address into the address bar of your web browser, you can open your router's configuration interface. (Your router's address may be different - check your manual.)

How data is sent to an IP address on another network

The following diagram illustrates how your home computer might obtain an IP address and send data to an IP address on another network.

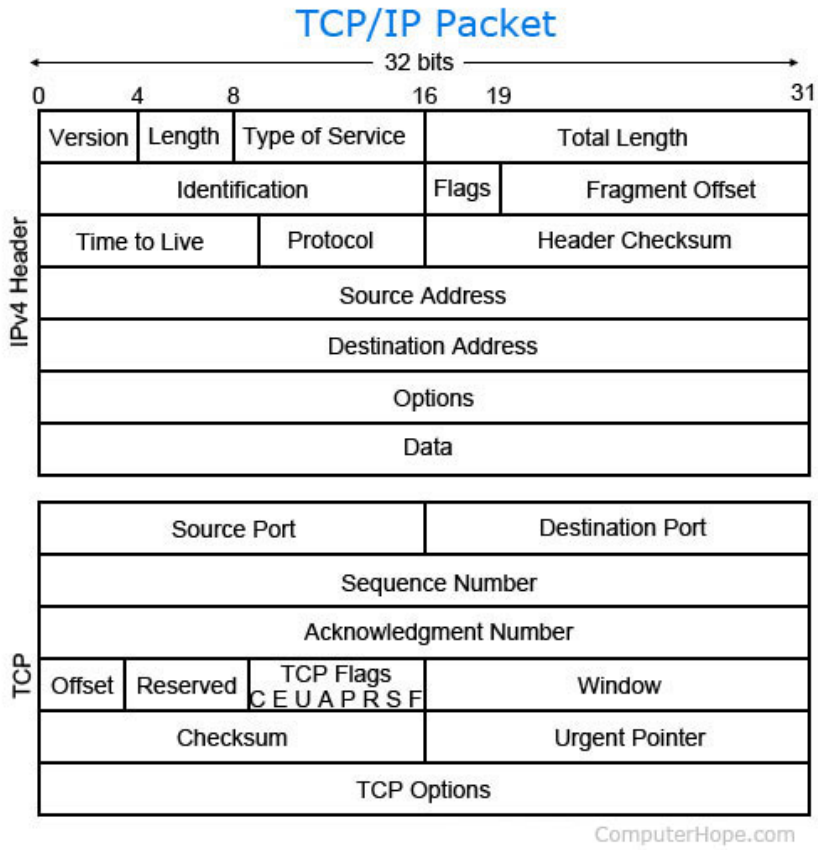


Packet

The packet is a term first coined by Donald Davies in 1965 that is used to describe a segment of data sent from one computer or device to another over a network. You can think of it as a package filled with data being delivered to another area. A packet is used because it divides data into easier-to-manage "chunks," which move information more efficiently and keep network resources from being tied up by a single, larger file.

What is in a packet?

A packet contains a source, destination, data, size, and other useful information that helps packet make it to the appropriate location and get reassembled properly. Below is a breakdown of a TCP packet.



Network packet basics

- Another name for a packet is a datagram.
- Data transferred over the Internet is sent as one or more packets. The most common packet sent is the TCP packet.
- The size of a packet is limited, so most data sent over a network is broken up into multiple packets before being sent out and then put back together when received.
- When a packet is transmitted over a network, network routers and switches examine the packet and its source to help direct it to the correct location.
- During its transmission, network packets can be dropped. If a packet is not received or an error occurs, it is sent again.

ASSIGNING IP ADDRESS

When organizing your home network, it's easier to assign each computer its own IP address than using DHCP. Here we will take a look at doing it Windows 7, Windows 8.x, and Windows 10.

If you have a home network with several computes and devices, it's a good idea to assign each of them a specific address. If you use DHCP (Dynamic Host Configuration Protocol), each computer will request and be assigned an address every time it's booted up. When you have to do troubleshooting on your network, it's annoying going to each machine to figure out what IP they have.

Using Static IPs prevents address conflicts between devices and allows you to manage them more easily. Assigning IPs to Windows is essentially the same process, but getting to where you need to be varies between each version.

If you are using windows 7, windows 8.1, windows server or windows 10 do the following instructions.

1. Type **ncpa.cpl** then click **OK** or press **Enter**.

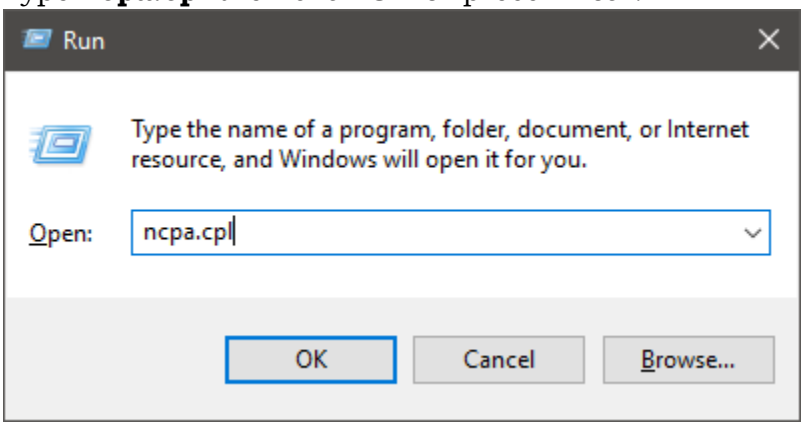


Figure 1 Run command

2. Right-click on your local adapter and select Properties.

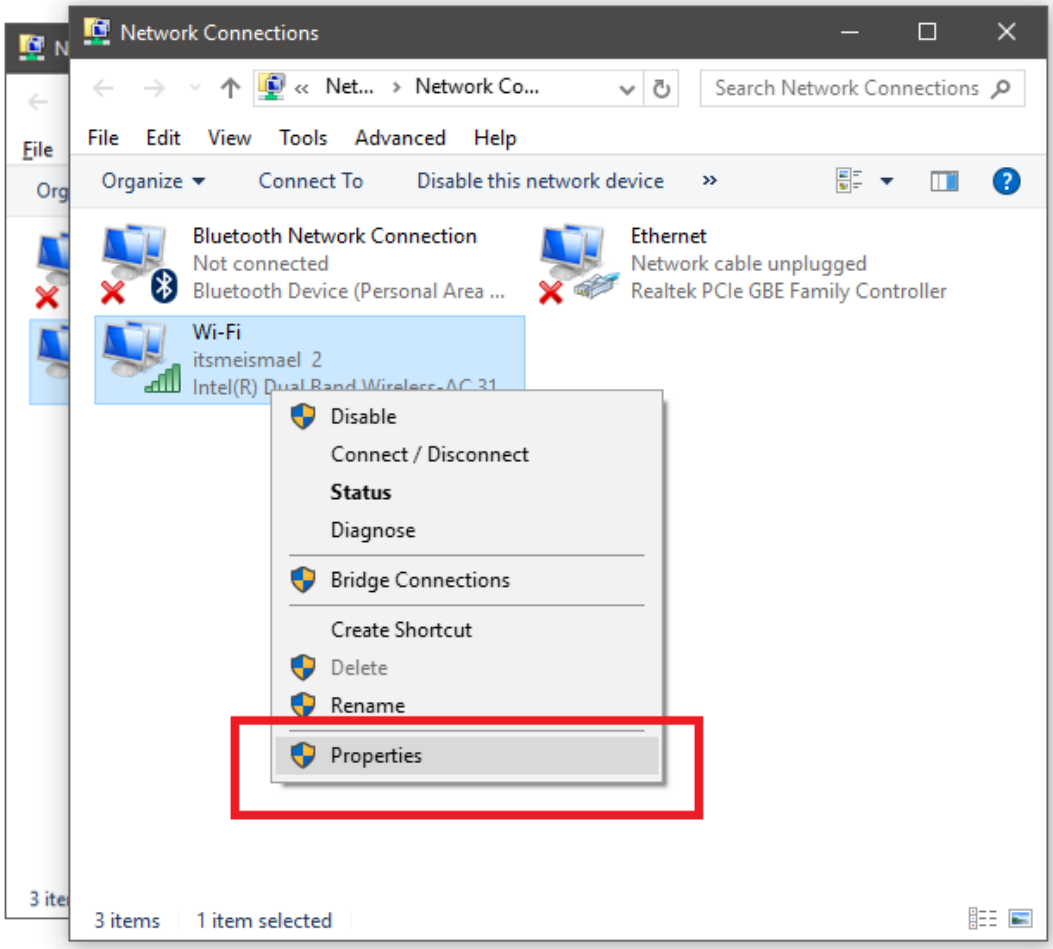


Figure 2 Network connection properties

3. In **the Local Area Connection Properties** window **highlight Internet Protocol Version 4 (TCP/IPv4)** then click the **Properties** button.

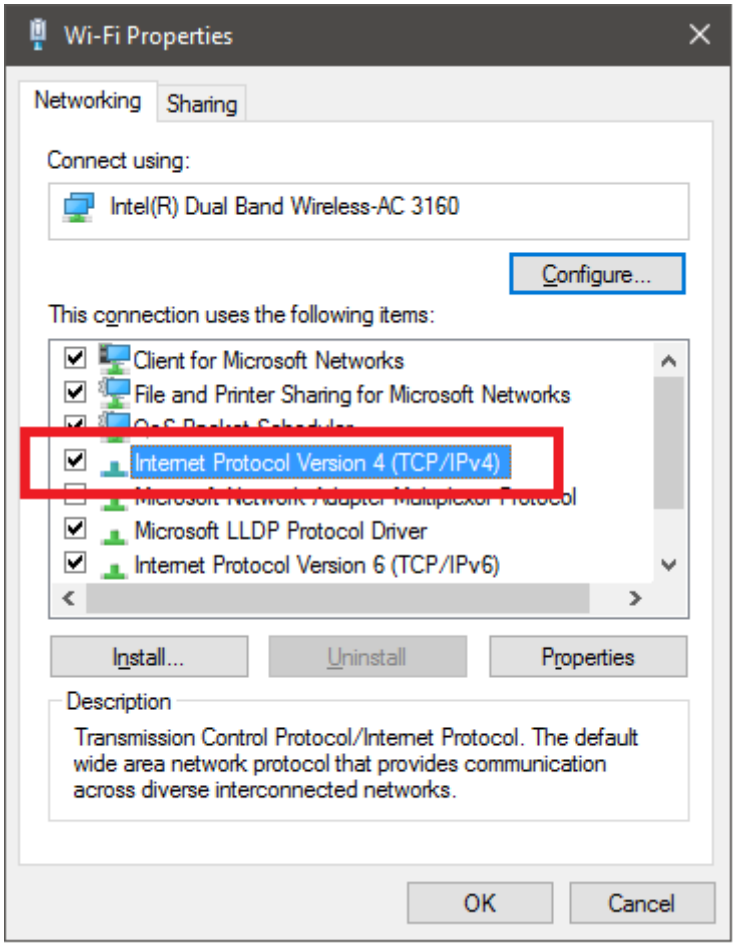


Figure 3 Network connection properties

4. Now select the radio button **Use the following IP address** and enter in the correct IP, Subnet mask, and Default gateway that corresponds with your network setup. Then enter your Preferred and Alternate DNS server addresses. Here we're on a home network and using a simple Class C network configuration and default configuration based on my router's configuration setting. In this case connection is connected to a hotspot named as "itsmeismael" I used its default gateway address for default gateway and dns address. I strongly recommend that if you have router with an internet connection it is best practice to configure your DNS and default gateway based on your routers address for you to enable internet connection failure to do so, it may lead to WAN network disconnection. Figure 4.1 it shows the default gateway address that must to use for DNS and default gateway configuration.

To check your gateway address open your command prompt then type ipconfig

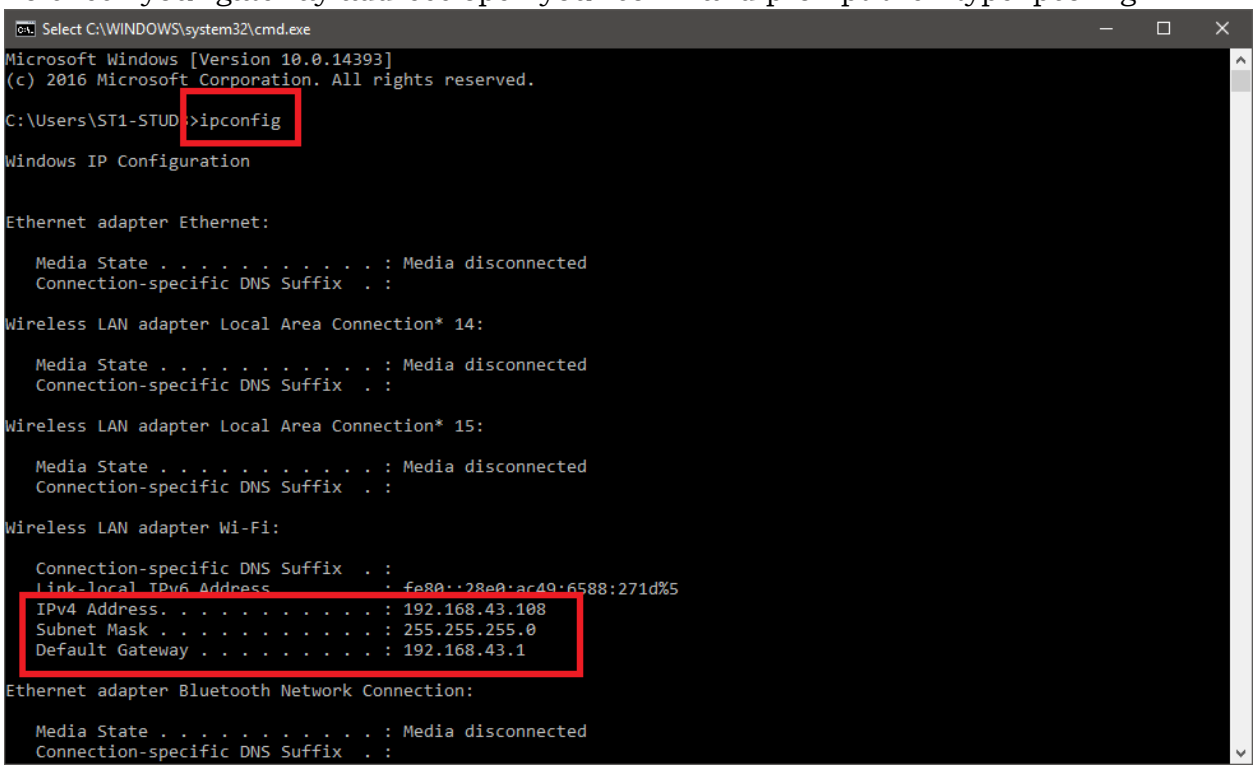


Figure 4.1 Checking default gateway address

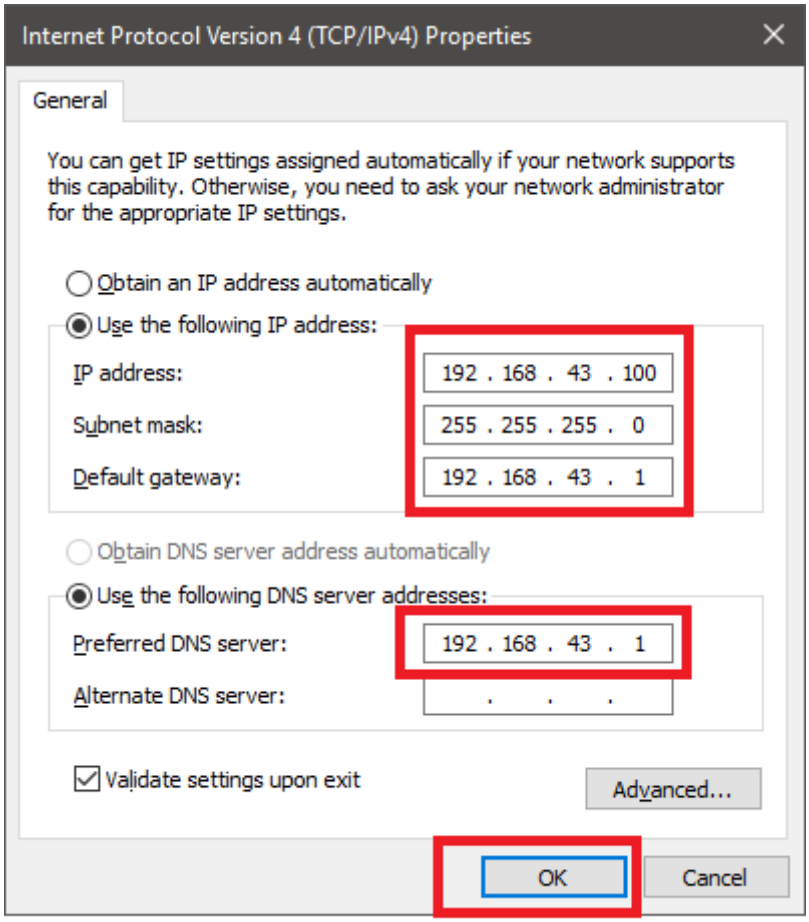


Figure 4.2 TCP/IPv4 Properties

When you're finished click OK.

5. Open the command prompt and type ipconfig to see if the network adapter settings have been successfully changed.

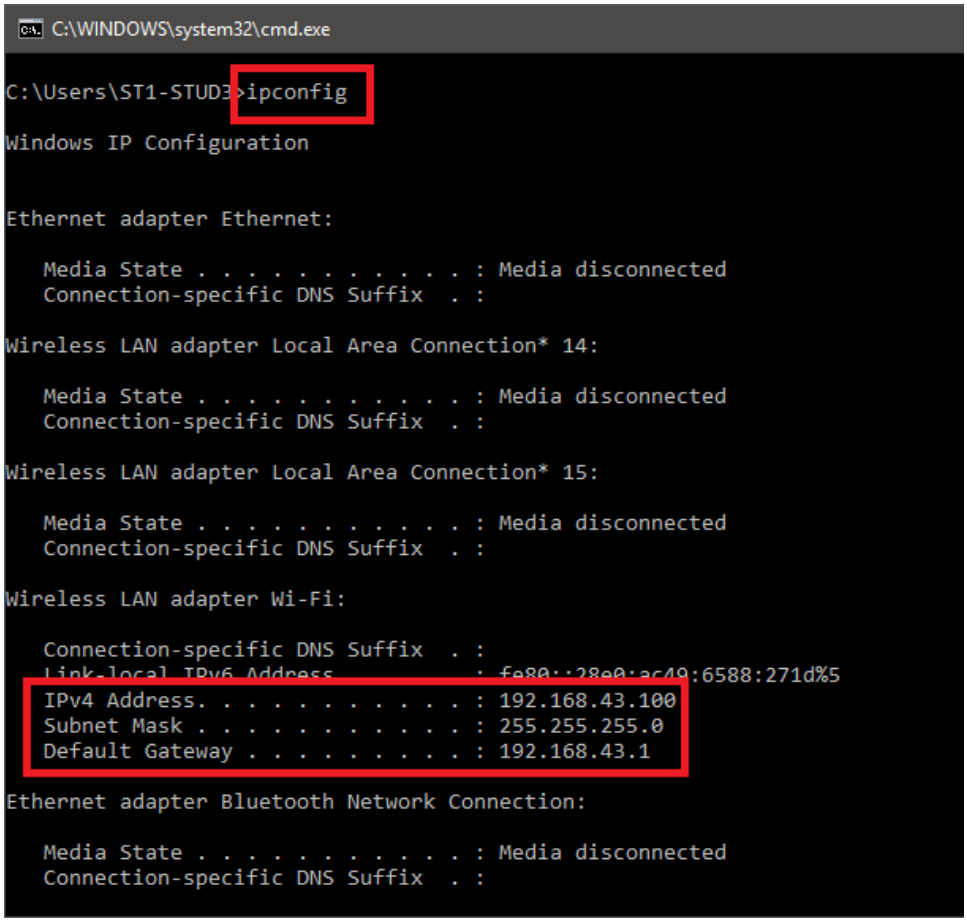


Figure 5 Checking configured ip configurations

Summary

This configuration is applicable in most of windows operating system. In this lesson I used windows 10 version build 14393. In configuring static IP address we need to remember some key points such as, gateway and dns ip address. We could not create different range of IP addresses that contrast to current network configuration if we are going to connect our computer to an existing WAN. However, we can skip DNS and default gateway if just wanted to test the connectivity of two or more different nodes in a standalone LAN connection and without having router, gateway or any ISP modem.

TASK SHEET 2.2-5

Title: Setting-up address

Performance Objective: Given are the following materials, you should be able to assign ip addresses an test the connectivity. Allotted time 30 minutes.

Supplies/Materials : UPT cable and switch

Equipment : 2 Computer with enabled LAN connections

Prerequisites:

Fundamentals of networking, ethernet cable configuration (T68B and T568 A)

Steps/Procedure:

1. Read information sheet 2.2-5 IP addressing
2. Connect your 2 computers directly to your switch
3. Assign an ip address for each computer
   Where:
   Computer 1 IP address = 192.168.0.10
   Computer 2 Ip address = 192.168.0.11
4. Open command prompt then type **ipconfig** to check the result in both computers.
5. Test node connectivity by pinging the computer's ip address. Stay on the command prompt and type the following

   E.g.

   Computer 1

   ping 192.168.0.11

   Computer 2

   ping 192.168.0.10

Assessment Method:

Demonstration, Observation

Performance Criteria Checklist 2.2-5

Trainee's Name: _____ Date: _____

During the performance of the task, did you consider the following criteria?

CRITERIA	**YES**	**Grade Point Equivalent** *Highest Possible Score = 5* *Lowest Possible Score = 0*	**NO**
Did the trainee…			
1. Properly assigned ip addresses according to its job requirements.			
2. Properly configured			
3. Applied and Performed occupational health safety procedures			
4. Performed and followed completely the given tasks?			

Total Points	
Total Items	
Signature of the Trainee/Learner	
Signature of the Trainer	

Grade Point Equivalent

The table shows the equivalent points that are used and show how they are calculated to determine the grade point average (GPA), or index.

The highest equivalent points that trainer can give is 5 points per criterion and the lowest is 0. If the trainee/learner accumulate scores with below two (2) *grade point equivalent*, she/he needs to retake the whole given task.

Grade Point Equivalent	**Explanation**
5	Excellent
4	Very Good
3	Good
2	Average
1	Poor
0	Failure